

## PESTS OF PUBLIC HEALTH IMPORTANCE

### INSECT PESTS

**Common name(s):** Bed bug

**Scientific name, classification:** *Cimex lectularius*, **Order:** Hemiptera, **Family:** Cimicidae.

**Distribution:** Worldwide.

**Description and ID characters:** Reddish-brown insects, about 1/8 inch in length, usually found in or around beds and furniture.

**Best identifying features:** Reddish-brown color, wingless, oval or elongated oval, crawl, but do not jump or fly. Unfed bed bugs are extremely flat and almost circular in outline, but after feeding the abdomen becomes elongated and rounded. Nymphs are smaller, bright red just after a blood meal, but almost clear or cream colored if unfed, often with a dark spot in their abdomen indicating digested blood from a previous meal.

**Pest status:** Important blood feeding pest of public health concern, due to severe physical, mental, social and economic effects on affected people.

**Damage/injury:** All stages of bed bugs except the eggs feed on blood. Humans are their preferred hosts, although they will feed on pet animals and birds. They pierce the host's skin using their needle-like proboscis and draw out blood. Their bites are not felt and bed bugs rarely awaken a sleeping person. Bed bugs can cause a number of health effects, including skin rashes, psychological effects, and allergic symptoms. The term for bed bug bites is 'cimicosis', which can manifest in varying levels of severity, from no visible symptoms, small red bumps or welts or prominent spreading blister-like swellings. Repeated bites tend to generate more severe reactions, and heavy infestations can cause anemia in children and the elderly.

Secondary infections can occur due to the scratching of bites.

Bed bugs can carry several pathogens in and on their body, but they have not proven to be competent vectors of disease causing pathogens under normal living conditions.



Adult bed bug  
Photo: Gary Alpert



Bed bug nymph  
Photo: Gary Alpert



Bed bug adults, nymphs and eggs on a nickel  
Photo: Whitney Cranshaw

**Life history:** Bed bugs are parasitic insects and feed exclusively on blood, and are most often found in association with humans. They usually spend the daytime hidden in cracks and crevices of beds, beddings, furniture, clothing and other articles in or near beds, as well as borders of walls, under carpets, inside electrical outlets, and almost any dark protected space. Feeding is by night, but occasional daytime feeding occurs. They do not fly or jump, but can run rapidly over a surface, especially in response to a disturbance.



Bed bug eggs  
Photo: Gary Alpert

Adult bed bugs mate by a process called ‘traumatic insemination’, where the male pierces the female’s abdomen and injects sperm, which travels through the female’s body to the ovaries where the eggs are fertilized. Eggs are elongated and white in color, and can be laid on any of the possible locations in a home, where the adults hide. Nymphs pass through five stages before reaching adulthood. All nymphal stages require full blood meals to pass on to the next stage, and adults require full blood meals to become sexually mature. All stages, including eggs, nymphs in various stages of development, their molted skins, and adults can be found together in groups, along with their darkly colored fecal material. Dark fecal spots along mattress seams and blood stains on bed linen are often the first signs of an infestation. High populations of bed bugs can cause a typical musty-sweet, ‘buggy’ or fruity odor in a room.



Bed bug infestation with adults, nymphs, eggs, feces and molted skin  
Photo: Barbara Bloetscher, Bugwood.org

Reports of bed bugs are ever increasing throughout the U.S. and any suspected case should be investigated as a priority.

Precautions should be taken to avoid accidental transfer of bed bugs. Effective treatments are available, and professional help should be sought to treat confirmed infestations as soon as possible.

**Common name(s):** Conenose bug, kissing bug, assassin bug, triatomine, western corsair.

**Scientific name, classification:** Different genera, *Triatoma* and *Rhodnius* are common genera. **Order:** Hemiptera, **Family:** Reduviidae, subfamily Triatominae.



Conenose bug, *Triatoma rubida*  
Photo: Charles Hedgcock

*Triatoma rubida*, *T. protracta*, *T. gerstaeckeri* and *Rhodnius prolixus* are common in the southwest.

**Distribution:** Worldwide.

**Description and ID characters:** Large, dark brown or black true bug with different patterns and markings varying with the species, about  $\frac{3}{4}$  to slightly over 1 inch in length. Wings are held flat over the back, and extend to the end of the abdomen, but do not cover the abdomen fully so abdomen margins are visible beneath them.

**Best identifying features:** Distinct tan or red-and-black margin of abdomen visible beyond the wings, small conical or elongated pointed head with four-segmented antennae arising off the pointed part of the head, conspicuous eyes, and a three-segmented straight beak that extends backward below the body. Nymphs are similar in appearance to adults except they are smaller and lack wings.

**Pest status:** Occasional biting pest of public health concern, due to ability to transfer disease-causing microorganisms, specifically the protozoan *Trypanosoma cruzi* responsible for Chagas disease.

**Damage/injury:** Conenose bugs are bloodsucking parasites that feed on a wide variety of domestic and wild animals, plus humans. They live outdoors in packrat or other rodent nests, but occasionally fly indoors attracted to lights. Once indoors, they actively seek out humans and other



Conenose bug, *Triatoma protracta*  
Photo: James Gathany, CDC



Conenose bug-side view showing beak  
Photo: Pest and Disease Image Library



Conenose bug, *Triatoma gerstaeckeri*  
Photo: S. Kjos, CDC



Conenose bug, *Rhodnius prolixus*  
Photo: Thierry Heger

domestic animals to feed. Although the bites themselves are mostly painless, intense itching and tenderness may be experienced at the bite site, which can become swollen and reddish to purple. The irritation may last one to two weeks, but sensitive individuals may experience more severe and prolonged reactions that

are potentially dangerous and life-threatening. Conenose bug bites can be confused with bites from other arthropod pests such as spiders, scorpions, or bed bugs because they can look similar. A useful clue that might be helpful to identify the source of bites is that conenose bug bites usually occur in late spring to early summer, and not at other times. If bites are noticed, a more detailed and careful examination of the bed and surrounding areas is imperative. Conenose bugs feed rapidly and obtain a full meal in about 10-15 minutes if undisturbed. After feeding, they detach from the host and move away, but sometimes engorged bugs cannot move fast and may be found among bed linen, near pet resting areas or on the ground indoors.

In southern and central parts of South America, conenose bugs are the primary vector of Chagas disease, which is a severe, often lethal disease caused by the protozoan *Trypanosoma cruzi*. They are called ‘kissing’ bugs because of their habit of biting sleeping victims on the tender skin around the mouth. Incidence of Chagas disease is low in the United States, even though many species of conenose bugs carry *T. cruzi* in their gut. The bugs are not effective vectors; they do not inject the pathogen directly into the blood of their hosts during a bite but it is transmitted through their feces, when the feces is scratched into an open wound, or ingested when bite sites around the mouth or eyes are rubbed. However, it is important to recognize that higher populations of conenose bugs might be indicative of higher incidences of Chagas disease. Reports of increasing numbers of Chagas disease cases in dogs have been reported in southern Texas.

Other members of the family Reduviidae are called **assassin bugs** because they are predators of other insects and are actually beneficial.

**Life history:** Conenose bugs live and breed outdoors, in the nests of wood rats or pack rats (*Neotoma* species) and other wildlife. They are nocturnal and spend the daytime hidden in these nests or other dark concealed spaces, and actively seek out hosts and feed at night. Overwintering takes place as nymphs and adults emerge in the spring. Eggs are laid in rodent nests in summer or early fall and they hatch in three to five weeks. The newly hatched nymphs pass through five nymphal stages before turning into mature adults, and each stage requires a full blood meal to pass on to the next.

**Common name(s):** Corsair

**Scientific name, classification:** Different genera, *Melanolestes*, *Rasahus* are common genera. **Order:**

Hemiptera, **Family:** Reduviidae, subfamily Peiratinae. Common southwestern species are the black corsair *Melanolestes picipes*, the western corsair *Rasahus thoracicus*.

**Distribution:** Worldwide.

**Description and ID characters:** Medium to large sized, dark brown or black true bugs, about  $\frac{3}{4}$  to slightly over 1 inch in length.



Western corsair  
Photo: Kansas Dept. of Ag.

Markings and patterns on the body vary with the species. Wings are held flat over the back.

**Best identifying features:** Strong resemblance to conenose bugs, but when viewed from the side, the head is not conical and elongated, but rounded; and the beak is stout and curved, as opposed to the straight beak in conenose bugs. These features are clearly adapted for the predatory nature of corsairs. Another difference is the presence of slightly thickened areas on the inner sides of the tibiae on first and second pair of legs in corsairs, which are absent in conenose bugs. These ‘ankle weights’ or ‘leg warmers’ are actually modifications that help these predatory



Conenose bug-side view  
Photo: Pest and Disease Image Library



Corsair-side view  
Photo: Mike Quinn

bugs to capture and hold on to prey while feeding. Males have fully developed wings, but females are seen in wingless, short-winged and fully-winged forms.

**Pest status:** Occasional biting pest, often confused with conenose bugs.

**Damage/injury:** Corsairs do not feed on blood, nor do they require blood to mature and reproduce. They are predatory on other insects and small invertebrates. However, they can give a painful bite if handled.

**Life history:** Adult corsairs overwinter in a suitable concealed spot under rocks, fallen wood or other debris, and become active in the spring. Eggs are laid in the soil. The emerging nymphs are also

excellent predators. They mostly pounce on their prey from behind and hold on to them using their ankle pads. Corsairs are mainly found outdoors, but they are often found near homes and structures in the summer catching other insects that are attracted by lights.



Black corsair  
Photo: Mike Quinn

### Conenose bug/corsair look-alike

The ‘masked hunter’ *Reduvius personatus* is a similar predatory reduviid bug that is often confused with the black corsair. These belong to a different subfamily (Reduvinae) and get their name from the nymphs which practice camouflage by

covering themselves with dirt and other debris. This helps them to stay hidden and attack unsuspecting prey. If viewed together, black corsairs are often smaller, and have thicker legs with more prominent ‘ankle weights’. Masked hunters occupy similar habitats as the black corsairs, and also deliver painful bites if handled. Indoors, they are good predators of bed bugs, if present, and their presence is sometimes regarded as indicative of bed bugs.



Masked hunter  
Photo: ©Entomart



Masked hunter nymph camouflage  
Photo: Whitney Cranshaw

**Common name(s):** Flea

**Scientific name, classification:** Different genera, **Order:** Siphonaptera, **Family:** Different families. Common fleas that may be found in the southwest include the cat flea *Ctenocephalides felis*, the Oriental rat flea *Xenopsylla cheopis*, the sticktight flea *Echidnophaga gallinacea* and the human flea *Pulex irritans*, all belonging to the family Pulicidae. The ground squirrel/prairie dog fleas *Oropsylla montana* and *O. hirsuta* (family Ceratophyllidae) are of importance as vectors of plague in wild rodents.

**Distribution:** Worldwide.

**Description and ID characters:** Fleas are small, wingless blood-sucking insects that live as external parasites on various mammals and birds. Fleas are mostly shades of brown in color, and have hard, shiny, laterally flattened bodies for easy movement through fur or feathers. This also makes them difficult to find on an animal or bird body and enables them to withstand pressures exerted by scratching, rubbing or squeezing. Their bodies are covered with stiff hair arranged like combs,



Magnified view of adult cat flea (left) and closer view of head region (right) showing distinct combs in front of the head (genal) and back of the neck (pronotal)

Photos: Pest and Disease Image Library

which also aid movement as well as help fleas to latch on to their host. They have strong hind legs modified for jumping that help them to disperse and find new hosts.

**Best identifying features:**

Identification of fleas is difficult, even with magnification, and expert help will be required. Some of the characters used to differentiate between fleas are their body shape, length of mouth parts and the ‘combs’ (groups of hairs) on different parts of their bodies. The presence of ‘combs’ or groups of thickened hairs on the front of the head, resembling a beard (genal comb), and on the back of the neck (pronotal comb) are often diagnostic of fleas in the genus *Ctenocephalides*. Other common fleas possess only one of these kinds of combs, or none.

**Pest status:** Important biting pests, vectors of pathogenic microbes, may also passively carry pathogenic microbes.

**Damage/injury:** Fleas insert their thin, tube-like mouthparts into their host’s skin to draw out blood. They are significant causes of concern for animals and humans not only because of their irritating bites, but also their role in transmitting various pathogens.

**Life history:** Fleas undergo complete metamorphosis, and have four distinctly different stages in their life cycle. Eggs are laid on the host surface, but slide off on to the host’s surroundings or resting area. Larvae are worm-like and have chewing mouthparts, and feed on organic matter, including blood and feces from adult fleas, all of which are found in the habitat. They avoid light, and often stay hidden in pet bedding or cracks and crevices of shelters and other structures. Full grown larvae enclose themselves in a cocoon made of silk and debris to pupate and later emerge as adults.

Pupae are well camouflaged and are very hard to detect. Newly emerged adult fleas sense the host presence by warmth or other cues and jump on to its body and the cycle is repeated. Adult fleas feed only on blood and need blood to mature and reproduce.

The **cat flea *Ctenocephalides felis*** is the most widespread flea in the world. Cat fleas can infest cats, dogs and other mammals including humans. In small numbers, they usually cause little harm or annoyance to the animal, but severe infestations can cause dehydration and anemia. Some animals develop allergies to the fleas’ saliva, which results in a skin condition called flea allergy dermatitis. This can be extremely distressing for the animal. Cat fleas can transmit pathogens from animals to humans, which include those that cause bartonella, murine typhus, tapeworm infections and others.



Cat flea larva, in a microscopic slide  
Photo: Pest and Disease Image Library



Cat flea  
Photo: Joseph Berger

Adult cat fleas tend to remain on the host rather than dropping off periodically, as is the case with other fleas. Cat fleas are less frequent in the desert southwest; they are mostly acquired from more humid areas, for example when pets visit the coast with their owners. Their eggs and larvae are very susceptible to desiccation. Fleas are found on their hosts only as adults, and therefore treating the host animal alone is often not sufficient to control an infestation. It is also important to protect pet animals when visiting other regions.

### **Sticktight fleas/hen fleas *Echidnophaga***

***gallinacea*** are cosmopolitan pests of domestic animals, livestock such as cattle, sheep and goats, and birds. They are common on dogs and cats that live closely with poultry, and are also occasionally found on other small mammals such as ground squirrels. On the birds, the fleas are found attached to bare spots on the skin, such as combs and wattles, or around the eyes, while in animals, they are found on the tender skin around the outer ears. The fleas cause

extreme irritation and scratching often leads to secondary infection by bacteria. Large infestations may result in anemia and death in young animals. Sticktight fleas are not reported to transmit pathogens, but may carry them passively. Mature adults of both sexes jump around freely to find mates. After fertilization the females get attached to the host using their mouthparts and will not move even to lay eggs. Eggs are laid in the attached position and they fall to the ground, where the larval and pupal stages occur. Adults emerge from pupae within 3-4 days under favorable conditions, or may remain dormant for several months if the conditions are not favorable.



Sticktight flea  
Photo: Pest and Disease Image Library

### **Oriental rat fleas/tropical rat fleas**

***Xenopsylla cheopis***, are parasitic on rodents and are primary vectors of bubonic plague and murine typhus. They can also host and spread tapeworms and other pathogens.

Diseases can be transmitted from a female flea to her offspring through eggs. Their preferred hosts are rodents such as rats and mice, and they seek other hosts only when their rodent hosts are not available. The fleas acquire the plague bacterium, *Yersinia pestis* from infected rodents, and initially the bacterium lives harmlessly in the flea. Soon however, the bacterium multiplies and blocks the gut of the flea to such an extent that any blood it feeds is regurgitated. Thus, when the infected flea feeds on a new host, the bacteria from its gut is regurgitated back into the wound and the new host is infected. Rat fleas can also infest wild rodents such as chipmunks, squirrels and prairie dogs, which can all serve as reservoirs of *Y. pestis*. Oriental rat fleas are rarely encountered in the southwest as compared to other fleas, probably due to their



Oriental rat flea  
Photo: Pest and Disease Image Library

preference for more humid regions. However, they may be found in colder climates in some of the southwestern states and therefore, it is important to be aware and understand the risks associated with these fleas.

The **human flea** *Pulex irritans*, (and the related, more common species *P. simulans*), readily attack and infest many other mammals and birds despite its common name. It can also move from any one of these hosts to others. Flea bites appear as red and inflamed welts on the skin, accompanied by irritation and swelling. Reactions vary with individuals, and severe reactions may occur in more sensitive individuals. In unsanitary conditions, the fleas can spread all over the body and move between hair on eyebrows, eyelashes, underarms and pubic regions.



Human flea

Photo: Pest and Disease Image Library

The **ground squirrel flea** *Oropsylla montana* and **prairie dog flea** *O. hirsuta*, are primary vectors of naturally occurring plague or plague in the countryside in humans (as opposed to plague in urban areas, acquired by humans through infected rodent fleas) and sylvatic plague in rodents and prairie dogs. Both kinds of plague are caused by the bacterium *Yersinia pestis*.

Ground squirrel fleas commonly infest rock squirrels and wood rats inhabiting non-urban environments in various parts of the desert southwest. They are rarely found on other rodents. The process of transmission is similar to that occurring in the rat flea, but ground squirrel fleas and prairie dog fleas are not known to be effective vectors and are not likely to transmit the bacteria even if they bite humans.



Ground squirrel flea

Photo: John Monteneri/CDC

It is important to remember in this context, that bubonic plague still exists in the U.S. although it is completely treatable with antibiotics. More cases are reported from western parts of the country than others. The desert southwest with its warm, dry climate is favorable for unhindered populations of wild rodents and their flea parasites, and therefore provides ample opportunities for the bacterium to persist. Careful monitoring of these rodent populations is warranted.

**Common name(s):** Human louse

**Scientific name, classification:** *Pediculus*

spp., **Order:** Phthiraptera, **Family:**

Pediculidae. Two *Pediculus* species can infest humans: head louse *P. humanus capitis* and body louse *P. humanus corporis*. A third kind of louse, the crab louse *Phthirus pubis* (family Phthiridae) can infest pubic hair.

**Distribution:** Worldwide.

**Description and ID characters:** Tiny

gray or light brown colored, wingless

insects, about 1/8<sup>th</sup> inch in length, usually found on the scalp or among hair on the body.

**Best identifying features:** Tiny size, flattened body resembling a sesame seed, stout legs with grasping claws at the tips. Adult head lice can vary in color and take on a reddish tinge after feeding. Nymphs are smaller and cream colored, with a red spot in the center of their bodies after feeding.

**Pest status:** Important biting pest of public health concern, due to potential physical, mental, social and economic effects on affected people.

**Damage/injury:** Head lice feed by injecting small amounts of saliva and drawing out tiny amounts of blood from the scalp every few hours. The saliva may create an itchy irritation. A first case of head lice may not result in itching for four to six weeks. Once sensitized, subsequent infestations cause itching almost immediately. The most common symptoms are itching and sleeplessness. Scratching can lead to secondary bacterial skin infection. Lice can crawl relatively quickly, however they cannot fly or jump and therefore, direct head to head contact with an infested person is usually required to acquire them. Infestations of lice are called 'pediculosis', which is classed as a communicable disease. Head lice cases can result in extreme anxiety, embarrassment, unnecessary days lost from school for children (and work for parents), and pesticide exposure. However, head lice are not a sign of uncleanliness and do not vector disease causing organisms.

**Life history:** Head lice are obligate parasites spending their entire life on humans, meaning that they feed exclusively on human blood and cannot survive without it. The female lives for 3 to 4 weeks and lays approximately 10 eggs (nits) a day. The eggs are firmly attached to the hair shaft close to the scalp. Viable nits are camouflaged with pigment to match the



Adult head louse

Photo: Dani Barchana, Bugwood.org



Adult head louse after feeding

Photo: Gilles San Martin



Head louse egg (nit) on a hair

Photo: Gilles San Martin

hair color of the infested person. They are most easily seen at the hairline at the back of the neck. Empty egg casings are easier to see, appearing white against the hair. Eggs are incubated by body heat and hatch in 10 to 14 days. After they hatch, nymphs leave the shell and grow for about 9 to 12 days before reaching the adult stage. If left untreated, the life cycle may repeat every 3 weeks. Head lice usually survive for less than two days away from the scalp at normal room temperature. Eggs cannot hatch at an ambient temperature lower than that near the scalp. Laundering and totally drying clothing, soft toys and bedding will kill all stages.

**Common name(s):** Mosquito

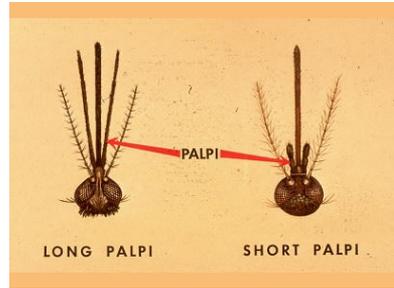
**Scientific name, classification:** Different genera, **Order:** Diptera, **Family:** Culicidae.

**Distribution:** Worldwide. Notable species in the southwest include the

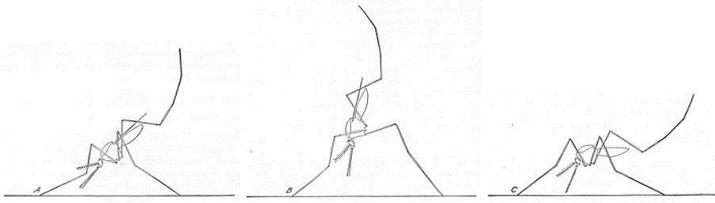
yellow fever mosquito *Aedes aegypti*, Asian tiger mosquito *Aedes albopictus*, inland floodwater mosquito *Aedes vexans*, malaria mosquito *Anopheles freeborni*, southern house mosquito *C. quinquefasciatus*, western encephalitis mosquito *Culex tarsalis*, and dark ricefield mosquito *Psorophora columbiae*.

**Description and ID characters:** Small, delicate flies, ranging from 1/8 to 1/4 inch in length. Appearance varies with species.

**Best identifying features:** Slender body and legs, females have a needle-like



Mosquito mouthparts are helpful in identification. Photo: CDC



Resting positions of adult mosquitoes, A and B: *Anopheles*, C: *Culex*  
Photo: W.V. King, G.H. Bradley & T.E. McNeel/ USDA

proboscis (piercing and sucking mouthpart), one pair of visible, delicate wings. Males of some species have distinct feathery antennae. Identification of mosquitoes can be tricky, owing to their small size and magnification is often required for confirmation. However, coloration and markings on some of their body parts can be helpful to distinguish species with the naked eye or with a hand lens. Mosquito body parts commonly examined for identification include palps (modified mouthparts adjacent to the needle-like proboscis), proboscis, wings, thorax, abdomen and legs. Resting positions are also helpful in identifying certain species.

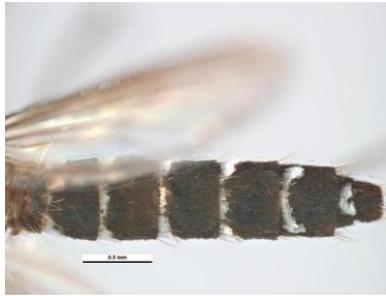
Identification tips for the predominant southwestern mosquitoes are as follows:

***Aedes aegypti* (Yellow fever mosquito)** - short, dark palps with white tips; dark proboscis, dark thorax with distinct white lyre-shaped pattern on the top and white patches on the sides, dark abdomen with white bands or patches on each segment, dark legs with white bands.



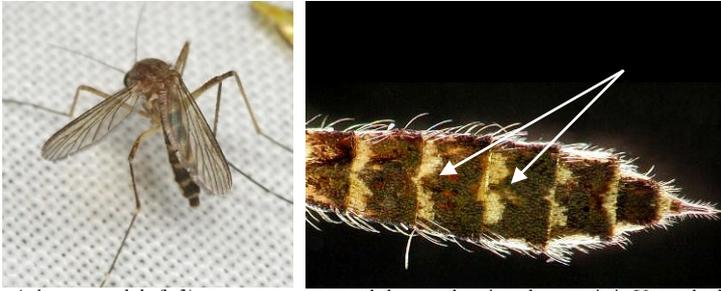
*Aedes aegypti* – side view (left) and front view (right) showing white lyre-shape on top of thorax, short palps with white tips. Photos: James Gathany, CDC

***Aedes albopictus* (Asian tiger mosquito)** - short, dark palps with white tips, dark proboscis, dark thorax with a white stripe through the center of the top and white patches on the sides, dark abdomen with narrow white bands on each segment, dark legs with white bands



*Aedes albopictus* adult (left), Photo: Susan Ellis; Abdomen with narrow white bands (right), Photo: Pest and Disease Image Library

***Aedes vexans* (Inland floodwater mosquito)** - short, dark palps with few white scales on the tips, dark proboscis, golden brown thorax, dark abdomen with pale V-notched bands, dark legs with very pale brown bands.



*Aedes vexans* adult (left), Photo: Mike Quinn; Abdomen showing characteristic V-notched bands (right), Photo: Michelle M. Cutwa-Francis

***Anopheles freeborni* (Malaria mosquito)** - overall, small, light brown body, dark, long palps which are as long as the proboscis, wings have discrete patches of dark scales, thorax is dull brown, abdomen lacks scales on its upper surface, legs are long and dark brown. Adults can also be identified by their typical resting position with their abdomens sticking up in the air rather than parallel to the surface on which they are resting.



*Anopheles freeborni* dorsal view showing wing pattern (left) and lateral view (right)  
Photos: Jim Moore



*Anopheles freeborni* adult feeding (left); close up of head (right)  
Photos: James Gathany, CDC

***Culex tarsalis* (Western encephalitis mosquito)** - short, dark palps; dark proboscis with prominent white band across the middle; dark gray thorax with pale white lengthwise stripes, dark, inverted V-shaped marks on underside of abdominal segments, prominent white bands across the tarsomeres (end segments) of the two back legs; other legs with pale stripe or line of pale-scaled spots.



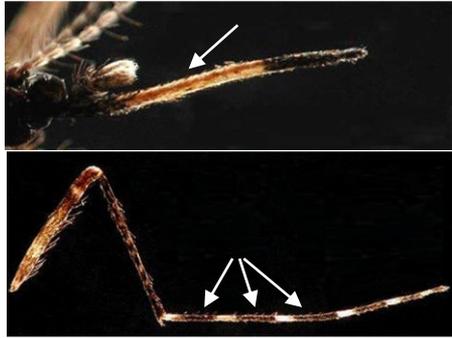
*Culex tarsalis* – dorsal view (left); ventral view (right)  
Photos: Joseph Berger, Bugwood.org

***Culex quinquefasciatus* (Southern house mosquito)** - short, dark palps; dark proboscis, straw colored thorax with small patches of white scales, slightly darker abdomen with five white ‘broad m’-shaped bands, dark legs.



*Culex quinquefasciatus* adult (left), Photo: James Gathany, CDC; Abdomen showing characteristic ‘broad m’ shaped marks (right), Photo: Michelle M. Cutwa-Francis

***Psorophora columbicae* (Dark rice field mosquito)** – overall large, dark body, dark palps with white tip, proboscis is dark with wide, pale ring around the middle, thorax and abdomen are dark black with a bluish or purplish sheen and silver or yellowish white markings, legs are dark and banded with white scales. The wings



*Psorophora columbicae* adult (left), Photo: Sean McCann;  
 Proboscis (right-top) and leg (right-bottom), Photo: Michelle M. Cutwa-Francis

are speckled dark brown and white. Underside of abdomen has symmetric patches of pale scales towards the bottom of each segment.

**Pest status:** All mosquitoes are regarded as annoying biting pests. Many species are of public health concern, due to the ability to transfer a number of disease-causing microorganisms.

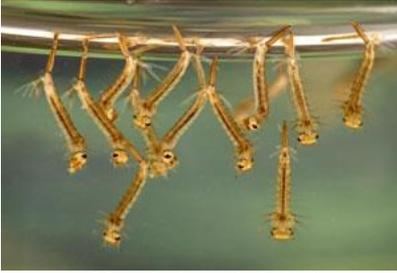


*Psorophora columbicae* abdomen  
 Photo: Virginia Mosquito Control Association

**Damage/injury:** Mosquitoes are one of the most important insect pests that affect the health and well-being of humans and domestic animals worldwide. Female mosquitoes require a blood meal for egg production, and they give a painful bite as they feed. While feeding, they can transmit a number of disease-causing organisms to humans and animals, including those causing West Nile fever, dengue fever, chikungunya, filariasis, yellow fever, and malaria. Specific mosquito species are associated with the transfer (vectoring) of specific pathogens.

**Life history:** Mosquitoes undergo complete metamorphosis, with four distinct stages- egg, larva, pupa and adult. Immediately after emerging males and females feed on flower nectar, plant sap or other sources of sugar. Males continue to take sugar meals, but female mosquitoes take blood meals, and the blood is used to produce eggs. A few days after acquiring a blood meal the female mosquito lays eggs. Depending on the species the eggs can be laid singly or in rafts, on the surface of the water, on the sides of containers, or on damp soil. The eggs hatch into larvae or “wrigglers”, which swim in the water and feed on microorganisms and decaying matter. The larvae need to come to the water surface to breathe using specialized siphons at the tail end of their body. After passing through several larval stages, the larvae turn into pupae or “tumbler”, which occur on the water surface. They do

not feed, but can swim actively by tumbling movements of their abdomen, and breathe using specialized structures (trumpets) drawing air directly from above the water surface. The adults emerge from the pupal skin in a few days and fly away. Larvae and pupae can be killed by cutting off their access to air with oils or



Mosquito larvae (wigglers)  
Photo: EPA



Mosquito pupa (tumbler)  
Photo: Project Manhattan

monomolecular films.

## NON-INSECT PESTS

**Common name(s):** Mite

**Scientific name, classification:** Different genera, **Order:** Acariformes (Subclass Acari/Acarina), **Family:** Different families.

**Distribution:** Worldwide.

**Description and ID characters:** Tiny, often microscopic arthropods with eight legs. Appearances vary greatly with families and species.

**Best identifying features:** Need magnification to identify.

**Pest status:** Some are important pests of plants, animals, birds and humans, and some are of public health concern due to the reactions they cause.

**Damage/injury:** The majority of mites are harmless to humans, but some can live and feed on human skin, cause allergic reactions or vector diseases. An infection caused by mites is called ‘acariasis’. The condition in animals, when accompanied by hair loss is called ‘mange’.

Some mite species are part of the natural fauna on human bodies and largely go unnoticed. For example, the **follicle mite (*Demodex folliculorum*)** is a microscopic mite that lives in the hair follicles or sebaceous glands of most humans. They are generally harmless and cause no irritation or discomfort.

**House dust mites**

**(*Dermatophagoides* spp.)** on the other hand cause problems worldwide. They are found in bedding, carpets and furniture containing natural fibers. They are scavengers that feed on human skin scales and other detritus but do not bite humans, but a significant number of



House dust mites  
Photo: Gilles San Martín

people are allergic to them and their allergens. They trigger allergic reactions, and respiratory problems including asthma. **Scabies (*Sarcoptes scabiei*) mites** (see detailed section below) are one of the more problematic mites that attack livestock, horses, dogs, rabbits and humans and cause scabies. The burrowing action and byproducts they create causes an intense itch and dermatitis that may be felt for weeks after the mite is dead. **Cheyletiella (*Cheyletiella* spp.) mites**, are another species that can become troublesome to humans. They cause a condition known as ‘Cheyletiella dermatitis’, which is manifested as skin irritation and scaling. The mites carry the fallen skin scales around, leading to the condition also being called ‘walking dandruff’. Cheyletiella dermatitis is contagious and can be spread to and from domestic animals such as dogs, cats, hamsters and rabbits. The mites do not burrow into the skin as do scabies mites, but live and feed on outermost layer of the skin surface (keratin). They can also enter the nose and cause rhinitis symptoms. The **straw itch mite (*Pyemotes tritici*)** often causes epidemics of dermatitis during harvesting and post-harvesting operations in grain crops. In more severe cases sweating, fever, headache and vomiting can occur. The straw itch mite is however also highly beneficial because they feed on larvae of wheat jointworm, rice and granary weevils, Angoumois grain moths and other pests. Tropical rat mites (*Ornithonyssus bacoti*), northern fowl mites *Ornithonyssus sylviarum* and tropical fowl mites *Ornithonyssus bursa* can become significant pests under certain conditions. When their primary hosts nest in, around or on homes, these mites may invade the structure and their bites can cause irritation and dermatitis. Problems often develop in the spring when birds such as house sparrows, rock doves, (feral pigeons), or mourning doves build their nests on or near homes. Their nests are often constructed below the eaves, in attics, in angles provided by roofing, rain gutters and spouts. Nests built in trees or vegetation in direct contact with structures also permit mites access. During the period when the female and her young occupy the nest, mites remain in the nest and on the birds, and their numbers may increase substantially. But when the young fledge and the nest is abandoned, mites move inside seeking an alternative host. Sudden excessive numbers of bites is often an indication of birds leaving nests. An occasional bite is more often due to pigeons congregating on roofs as daytime resting sites.

**Chiggers** (see detailed section below) are the larval stage of the mite *Trombicula alfreddugesi* and several other species of mites, which are parasitic only in the larval stage.

Diagnosis of mites and their reactions is often complicated and difficult. The mites themselves can be microscopic and scratching the irritated skin can further mask the true pathology. As a result, it may be confused with entomophobia (fear of insects) in certain people. Identification requires collecting and preserving the specimen immediately in alcohol before a microscopic examination can be performed. Medical help should be sought for treatment of scabies, dermatitis and other skin disorders.

**Life history:** The life cycle of mites has four basic stages: egg, larva, nymph and adult. The egg hatches into a larval stage (three-legged), which molts to the nymphal stage (four-legged) and after several more molts, the nymph matures into an adult.

## NOTABLE SPECIES

**Common name(s):** Scabies mite

**Scientific name, classification:** *Sarcoptes scabiei*,

**Order:** Acariformes-Sarcoptiformes (Subclass Acari),

**Family:** Sarcoptidae.

**Distribution:** Worldwide.

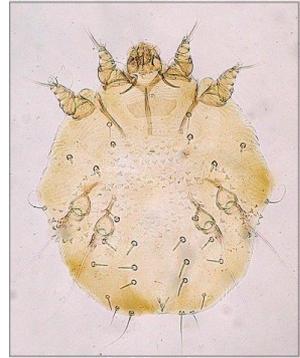
**Description and ID characters:** Adult scabies mites are about 0.01 inch in diameter. When viewed under a microscope, they can be seen as spherical in shape with multiple folds on the body surface. They have four pairs of legs and several spines all over their body.

**Best identifying features:** Needs medical test to determine.

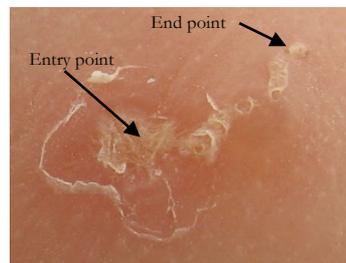
**Pest status:** Important pest of public health concern, due to their role in causing severe itching and discomfort.

**Damage/injury:** Causes scabies, which is an intensely pruritic (itchy), contagious infestation of the skin. Scabies can affect humans as well as many other mammals including domestic cats and dogs. The itching is caused by hypersensitivity to the mites, their eggs and feces and their burrowing action into the skin. First-time infestation may not cause immediate symptoms, but people who are sensitized can develop symptoms within hours. Visible symptoms include characteristic reddish rashes in various parts of the body and superficial burrows on the skin. An infection of scabies can be an extremely agonizing experience causing great embarrassment, physical suffering and mental stress to the affected persons. It is usually transmitted by direct contact with an infected individual or their personal items. Enclosed environments that house large numbers of people in close proximity, such as schools, shelters and medical facilities can be transmission locations. However, scabies is entirely treatable with timely medical intervention. Crusted or Norwegian scabies is a severe form of scabies that can occur in persons whose immune systems are challenged, or in elderly and otherwise disabled persons. The affected persons may not show the usual symptoms of itching or rashes, but they have thick crusts of skin that contain large numbers of scabies mites and eggs that are extremely contagious. These persons should receive quick and aggressive medical treatment for their infestation to prevent outbreaks of scabies. Persons with immunodeficiency challenges should avoid all contact with people affected with scabies or crusted scabies because of high risk of infection.

**Life history:** The scabies mite has four stages in its lifecycle: egg, larva, nymph, and adult. Mature adults mate on the skin surface of a suitable host, after which the males die. The female will then burrow into the outermost skin layer and deposit up to three eggs per day, and up to 30 eggs, before dying at the end of a



Scabies mite  
Photo: Alan Walker



Burrow of scabies mite on human skin  
Photo: Michael Geary

burrow. The eggs hatch into six-legged larvae, which burrow further into the skin and search for hair follicles in which they form ‘molting pouches’. Here, they will feed and molt into eight-legged nymphs, which undergo further molts and finally emerge as adults. Burrowing by adults and larvae, and feeding by all stages causes itching and rashes to worsen on the host. Mites can survive away from the skin for two-three days at normal room temperatures (longer if temperatures are low), and although most transfer occurs due to prolonged skin to skin contact, they may also spread on clothing, bath towels or other personal items of infected individuals. Suspected cases of scabies should be referred to a physician or dermatologist and treated with due attention.

**Common name(s):** Chigger, harvest mite, berry bug

**Scientific name, classification:** *Trombicula* spp.,

**Order:** Acariformes-Trombidiformes (Subclass Acari), **Family:** Trombiculidae.

**Distribution:** Worldwide.

**Description and ID characters:** Tiny, microscopic ( $1/150$  to  $1/120$  inch long), usually pale red or orange, mites that cannot be viewed with the naked eye.

**Best identifying features:** Needs magnification and expertise.

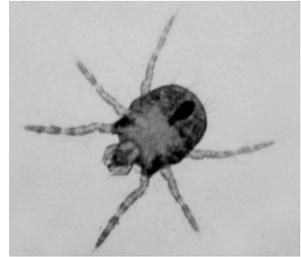
**Pest status:** Occasional biting pest of concern in grassy, riparian habitats, due to their intensely itchy bites, that may also cause other skin reactions.

**Damage/injury:** Chiggers do not burrow into the skin, but insert their mouthparts in a skin pore or hair follicle and feed on skin cells, the infection being called ‘trombiculiasis’. They do not actually "bite" but instead form a hole in the skin called a ‘stylostome’ and inject digestive enzymes into the skin that break down skin cells. They then chew up tiny parts of the inner skin, thus causing irritation. The itching may be accompanied by red, pimple-like bumps (papules) or hives and skin rash or lesions on a sun-exposed area. Chiggers are not known to transmit disease causing pathogens in the U.S.

**Life history:** Chigger adults (trombiculids) live in grassy and woody areas with tall vegetation.

They are most numerous in the summer when weed populations are highest. Adult trombiculid mites go through four stages in their life cycle: egg, larva, nymph, and adult. The nymphs and adults are independent predators that feed on other small arthropods or debris. They live in soil, and are often found when digging in yards or gardens.

The six-legged larvae (chiggers) are parasitic, and feed on the skin cells of a large variety of animals and birds, including humans. They can move rapidly, and once they get on to a human host, gather where clothing fits tightly over the skin such as the belt line, waistline, under bras, and under socks. They favor where the flesh is



Chigger

Photo: Hansell F. Cross



Adult trombiculid mite

Photo: Alan R. Walker

thin, or folded such as the ankles, in the armpits, back of the knees, in front of the elbow, or in the groin. Chiggers will stay on the host and engorge themselves till they fall to the ground, and molt into nymphs. Itching usually occurs after the larvae detach from the skin. Chiggers can penetrate most clothing, but high boots and trousers of tightly woven fabric tucked into stockings or boots help deter them. Mowing of weeds, trimming of vegetation, and close clipping of lawns, helps to eliminate shade and moisture. This will permit sunlight and air to circulate freely and reduce chigger populations.

**Common name(s):** Tick

**Scientific name, classification:** Different genera, **Order:** Parasitiformes (Subclass Acari), **Family:** Different families. Four species are likely to be encountered in the southwest. Three of these, the brown dog tick (*Rhipicephalus sanguineus*), American dog tick (*Dermacentor variabilis*), and the Rocky Mountain wood tick (*Dermacentor andersoni*) are “hard ticks”, which belong to the family Ixodidae. The fourth species, the adobe tick (*Argas sanchezii*) is a “soft tick” belonging to the family Argasidae.

**Distribution:** Worldwide.

**Description and ID characters:** Small,  $\frac{1}{8}$  -  $\frac{1}{4}$  inch long, pear shaped arthropods found as ectoparasites on mammals and birds.

**Best identifying features:** Four pairs of legs, flat pear shaped body when unfed, presence on and often attached to animal hosts. An engorged (fed) tick is easy to recognize by its swollen abdomen.

The body of a tick can be divided into two major sections: the ‘gnathosoma’ (head and mouthparts) and the ‘idiosoma’ (legs, digestive and reproductive parts).

**Pest status:** Important blood feeding pest of public health concern, due to their ability to transfer a number of disease-causing microorganisms.

**Damage/injury:** Ticks are the most common transmitters of vector-borne diseases in the U.S. When a tick feeds it takes up whole blood, extracts the water (about 70-75% volume) and injects the water back into the host. Thus they are efficient vectors of a variety of disease causing organisms including a variety of bacteria, spirochetes, rickettsiae, protozoa, viruses, nematodes, as well as troublesome toxins. A single tick bite can transmit multiple pathogens as well as creating secondary infections and allergic reactions. Ticks are known to vector several diseases, which include Lyme disease, Colorado tick fever, tick paralysis, tularemia and Rocky Mountain spotted fever.

**Life history:** Ticks have four stages in their life cycle: egg, larva, nymph and adult, and all stages except eggs require blood from a vertebrate host to survive and complete their development. Adult ticks and nymphs have four pairs of legs while the hatchlings (larvae) have three pairs. Eggs are laid on the ground or on the host depending on the species. Larvae and nymphs attach on to the hosts to feed, and detach to molt, repeating this process several times till they reach adulthood.



American dog tick  
Photo: Gary Alpert

Rodents and deer are most often associated with ticks however, between the many species of ticks; any wildlife in the yard may be associated with ticks. Brown dog ticks are the most pestiferous species from the standpoint of a homeowner because it is a parasite of their canine pets. They prefer dogs, but can also bite humans when their populations are high and sufficient numbers of primary hosts (dogs) are not available. Larvae can survive as long as eight months and adults as long as 18 months without feeding. Brown dog ticks thrive at high temperatures and can reproduce inside a home very successfully.



Brown dog tick nymphs; fed (left), unfed (right)  
Photo: Alex Pauvolid-Corrêa

### Sources, further information:

Bed bugs

<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1625-2014.pdf>

Chagas Disease <http://www.cdc.gov/parasites/chagas/>

Conenose bug

<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1109.pdf>

Head lice <http://www.cdc.gov/parasites/lice/head/>

Head lice management <http://ag.arizona.edu/urbanipm/buglist/headlice.pdf>

House dust mites <http://lancaster.unl.edu/pest/resources/dustmites311.shtml>

Mosquitoes <http://www.cdc.gov/nceh/ehs/topics/mosquitoes.htm>

Mosquitoes

<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1221.pdf>

Mosquito identification tables

[http://fmel.ifas.ufl.edu/key/id\\_tables/idtables\\_adult.shtml](http://fmel.ifas.ufl.edu/key/id_tables/idtables_adult.shtml)

Pests that sting, bite or injure

<http://www.ipm.ucdavis.edu/PMG/menu.house.html#STING>

Practical methods of controlling bed bugs at home

<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1642-2014.pdf>

Scabies <http://www.cdc.gov/parasites/scabies/>

Scabies [https://www.health.arizona.edu/health\\_topics/general\\_health/scabies.pdf](https://www.health.arizona.edu/health_topics/general_health/scabies.pdf)

Ticks <https://ag.arizona.edu/yavapai/publications/yavcobulletins/Ticks.pdf>

Working the bugs out

<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1563.pdf>